

REMARKS

Applicant requests favorable reconsideration and allowance of the subject application in view of the preceding amendments and the following remarks.

Claims 1-3, 8-14 and 16-20 are presented for consideration. Claims 1, 10, 13, 14 and 18-20 are independent. Claim 4 has been canceled without prejudice or disclaimer. Claims 1, 10-14, 16, 18 and 19 have been amended to clarify features of the subject invention. Support for these changes can be found in the original application, as filed. Therefore, no new matter has been added.

Applicant notes with appreciation that claims 18 and 20 have been allowed over the art of record. Applicant submits that the foregoing changes to claim 18 are merely editorial in nature and do not affect the allowability of that claim. Therefore, claims 18 and 20 should be remain allowable at the outset. In addition to these claims being allowable, Applicant submits that the present invention is patentably defined by independent claims 1, 10, 13, 14, and 19. Therefore, Applicant requests favorable reconsideration and withdrawal of the rejection set forth in the above-noted Office Action.

Claims 1-4, 10, 13, 16, 17 and 19 were rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 5,559,584 to Miyaji et al. in view of published U.S. patent application number 2003/0020888 to Tanaka et al. Applicant submits that the cited art, whether taken individually or in combination, does not teach many features of the present invention as previously recited in claims 1-4, 10, 13, 16, 17 and 19. Therefore, these rejections are

respectfully traversed. Nevertheless, Applicant submits that independent claims 1, 10, 13, 14 and 19, for example, as presented, amplify the distinctions between the present invention and the cited art.

In one aspect of the present invention, independent claim 1 recites an exposure apparatus for illuminating a reticle with exposing light from an exposing light source via an illuminating optical system and projecting a pattern, which has been formed on the reticle, onto a substrate via a projection optical system. The apparatus includes a vessel within which one of the illumination optical system and the projection optical system is placed, gas supplying means for supplying a desired gas to the vessel, vacuum exhaust means for vacuum evacuating the vessel in order to establish negative pressure in the interior thereof from atmospheric pressure, and control means for controlling a differential pressure between an internal pressure of the vessel and the atmospheric pressure so as not to exceed a differential pressure constant. The gas supplying means supplies the desired gas to the vessel after a pressure in the vessel is reached at a predetermined vacuum pressure by the vacuum exhaust means. The vacuum exhaust means is atmosphere-released if a concentration of gas in the vessel attains a predetermined concentration.

In another aspect of the present invention, independent claim 10 recites a method of manufacturing a semiconductor device. The method includes the steps of placing a group of manufacturing equipment, including an exposure apparatus for performing various processes, in a plant for manufacturing semiconductor devices, and manufacturing a semiconductor device by performing a plurality of processes using the group of manufacturing equipment. The exposure

apparatus includes a vessel within which one of an illuminating optical system and a projection optical system is placed, gas supplying means for supplying a desired gas to the vessel, vacuum exhaust means for vacuum evacuating the vessel in order to establish negative pressure in the interior thereof from atmospheric pressure, and control means for controlling a differential pressure between an internal pressure of the vessel and the atmospheric pressure so as not to exceed a differential pressure constant. The gas supplying means supplies the desired gas to the vessel after a pressure in the vessel is reached at a predetermined vacuum pressure by the vacuum exhaust means. The vacuum exhaust means is atmosphere-released if a concentration of gas in the vessel attains a predetermined concentration.

In a further aspect of the present invention, independent claim 13 recites a semiconductor manufacturing plant including a group of manufacturing equipment, including an exposure apparatus, for performing various processes, and a gateway for making it possible to access, from a local-area network, an external network outside the plant, whereby information relating to at least one of the pieces of manufacturing equipment can be communicated by data communication. The exposure apparatus includes a vessel within which one of an illumination optical system and a projection optical system is placed, gas supplying means for supplying a desired gas to the vessel, vacuum exhaust means for vacuum evacuating the vessel in order to establish negative pressure in the interior thereof from atmospheric pressure, and control means for controlling a differential pressure between an internal pressure of the vessel and the atmospheric pressure so as not to exceed a differential pressure constant. The gas supplying

means supplies the desired gas to the vessel after a pressure in the vessel is reached at a predetermined vacuum pressure by the vacuum exhaust means. The vacuum exhaust means is atmosphere-released if a concentration of gas in the vessel attains a predetermined concentration.

In still another aspect of the present invention, independent claim 14 recites a method of maintaining an exposure apparatus that has been installed in a semiconductor manufacturing plant. The method includes the steps of providing a maintenance database, which is connected to an external network of the semiconductor manufacturing plant, by a vendor or user of the exposure apparatus, allowing access to the maintenance database from within the semiconductor manufacturing plant via the external network, and transmitting maintenance information, which is stored in the maintenance database, to the outside of the semiconductor manufacturing plant via the external network. The exposure apparatus includes a vessel within which one of an illuminating optical system and a projection optical system is placed, gas supplying means for supplying a desired gas to the vessel, vacuum exhaust means for vacuum evacuating the vessel in order to establish negative pressure in the interior thereof from atmospheric pressure, and control means for controlling a differential pressure between an internal pressure of the vessel and the atmospheric pressure so as not to exceed a differential pressure constant. The gas supplying means supplies the desired gas to the vessel after a pressure in the vessel is reached at a predetermined vacuum pressure by the vacuum exhaust means. The vacuum exhaust means is atmosphere-released if a concentration of gas in the vessel attains a predetermined concentration.

In a still further aspect of the present invention, independent claim 19 recites an exposure method for illuminating a reticle with exposing light from an exposing light source via an illuminating optical system and projecting a pattern, which has been formed on the reticle, onto a substrate via a projection optical system. The method includes a gas supplying step of supplying a desired gas to a vessel within which one of the illuminating optical system and the projection optical system is placed, and a control step of controlling a differential pressure between the internal pressure of the vessel and the atmosphere so as not to exceed a differential pressure constant when the vessel is vacuum evacuated in order to establish a negative pressure in the interior thereof from atmospheric pressure. The gas supplying step supplies the desired gas to the vessel after a pressure in the vessel is reached at a predetermined vacuum pressure in the control step. The vessel is atmosphere-released using vacuum exhaust means if a concentration of gas in the vessel attains a predetermined concentration.

By such an arrangement, in the present invention recited in independent claims 1, 10, 13, 14 and 19, a reticle can be illuminated with exposing light from an exposing light source in an exposure apparatus via an illuminating optical system, and a pattern, which has been formed on the reticle, can be projected onto a substrate via a projecting optical system. The exposure apparatus, for example, can have a vessel within which the illuminating optical system or the projection optical system is placed. Further, a differential pressure between an internal pressure of the vessel and the atmosphere can be controlled so as not to exceed a differential pressure constant, with a desired gas being supplied to the vessel after a pressure in the vessel is reached

at a predetermined vacuum pressure by vacuum exhaust means. Then, the vacuum exhaust means can be atmosphere-released if a concentration of gas in the vessel attains a predetermined concentration.

Applicant submits that the cited art does not teach or suggest such features of the present invention, as recited in independent claims 1, 10, 13, 14 and 19.

The Miyaji et al. patent discusses supplying nitrogen gas to a vessel that includes an illuminating optical system and a projection optical system, so that the internal pressure of the vessel exceeds atmospheric pressure after a vacuum state is established by evacuating the interior of the vessel.

The Tanaka et al. publication discusses discharging air inside of a casing CA of an illuminating optical system 200 and the inside of a lens barrel LB of a projection optical system by a gas discharge device 160. When pressure values measured by pressure sensors PS1 to PS3 reach a predetermined value, an outlet-side open/close valve at the discharge device 160 is closed. Then, nitrogen gas is supplied by a gas supply device 150 into the casing CA and the lens barrel LB. When pressure values measured by pressure sensors PS1 to PS3 reach a predetermined value, the nitrogen gas supplied by the gas supply device 150 is stopped and an input-side open/close valve at the discharge device 160 is closed.

Further, in the Tanaka et al. publication, the degrees of opening of the pressure control valves V1 (which is provided between a space 311 and the gas supply discharge device) and V2

(which is provided between the space 311 and the gas discharge device 160) is adjusted so as to bring pressure values measured by the pressure sensors PS1 to PS3 to a predetermined value.

Applicant submits, however, that the cited art, whether taken individually or in combination, does not teach or suggest that, in order to control a differential between an internal pressure of a vessel and the atmosphere so as not to exceed a differential pressure constant, a desired gas should be supplied to the vessel after a pressure in the vessel is reached at a predetermined vacuum pressure by vacuum exhaust means and then the vacuum exhaust means is atmosphere-released if a concentration of the gas in the vessel attains a predetermined concentration. Accordingly, Applicant submits that the cited art does not teach or suggest the salient features of Applicant's present invention as recited in independent claims 1, 10, 13, 14 and 19.

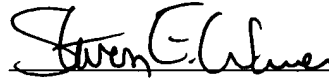
For the foregoing reasons, Applicant submits that the present invention, as recited in independent claims 1, 10, 13, 14 and 19, also is patentably defined over the cited art.

Dependent claims 2, 3, 8, 9, 11, 12, 16 and 17 also should be deemed allowable, in their own right, for defining other patentable features of the present invention in addition to those recited in their respective independent claims. Further individual consideration of these dependent claims is requested.

Applicant further submits that the instant application is in condition for allowance. Favorable reconsideration, withdrawal of the rejection set forth in the above-noted Office Action and an early Notice of Allowance are requested.

Applicant's undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010 All correspondence should continue to be directed to our address given below.

Respectfully submitted,

A handwritten signature in dark ink, appearing to read "Steven E. Warner", is written over a horizontal line.

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